

BULLETIN OF MISCELLANEOUS INFORMATION No. 6 1927

ROYAL BOTANIC GARDENS, KEW

XXX.—THE GENUS *DIOSCOREA* IN SIAM. D. PRAIN and I. H. BURKILL.

In some bundles of Siamese plants we have been privileged to examine, we find examples of 32 species belonging to the genus *Dioscorea*, and referable to the following sections :—*Stenophora*, 4 ; *Shannicorea*, 2 ; *Combilium*, 1 ; *Opsophyton*, 1 ; *Lasiophyton*, 8 ; *Enantiophyllum*, 13 ; with one which we transfer to the section *Stenocorea* and two to which it is as yet unsafe to assign their actual position. The Asiatic section *Paramecocarpa* has not yet been reported from Siam.

Phytogeographically these species belong to various floras that meet in Siam. Thus *D. velutipes*, a member of the small section *Shannicorea*, which is characteristic of the flora common to the Shan Hills and Yunnan, has only been reported from Payap, the most northern circle of Siam : the species of this section occur in a region where the higher hills are pine-clad, and are sometimes met with in the pine forests. Another species met with, in Siam only in the Payap circle, is *D. kamoonsensis*, which occurs throughout the area occupied by the section *Shannicorea*, but extends westward beyond that area, along the Himalaya, at about 1200–1300 m. above sea-level, as far as Lohathal (long. 80° 8' E.) in Kamaon. The endemic *D. pseudo-nitens*, here described, which so far has only been reported from the Payap circle, may perhaps be accounted a member of this particular flora.

Species belonging to the Burmese flora which extend to Siam, are *D. Prazeri*, *birmanica*, *Arachidna*, and *decipiens* : these occur away from the pine-forests, though not necessarily away from the oak-chestnut forests ; to the group may be added *D. Hamiltonii*, a species that has acquired an extension westward from Burma along the Himalaya, but not so far as *D. kamoonsensis*. These five species occur in Siam to the south of the circle of Payap ; indeed *D. Prazeri* extends in Lower Siam southwards as far as lat. 8° N., while *D. Hamiltonii* has been met with a little south of lat. 11° N., in the Tavoy district of Tenasserim : the westward extension of this last has carried it across the Bengal alluvium into Chota Nagpur, and beyond into the Malabar Ghats, where its southern limit is somewhat nearer the Equator than its southern limit in Tenasserim.

Though the climates of Siam have not yet been worked out systematically, the meteorological data available indicate the existence of a belt of heavy rainfall in the tract of hill-country extending along the eastern side of the Gulf of Siam and into Indo-

China. To the flora of this belt *D. Pierrei* and *D. brevipetiolata* appear to belong: both species were first described from Indo-China, but have since been met with in Siam. Another member of this flora seems to be *D. kratica*. Perhaps *D. daunaea* may also belong, though this species crosses the low rice-country of Central Siam and was first described from the Dawna Hills in the Amherst district of Tenasserim, some fifteen miles west of the Siam-Burma boundary, and has not yet been recorded from Cochin-China. Intermediate in distribution between these and the Burmese group is *D. membranacea*.

The extension of the Malayan flora into Lower Siam sufficiently explains the collection within the Siamese border of three Malayan species, *D. myriantha*, *D. orbiculata* and the *Dioscorea* no. 19 of our enumeration. This last is not the only species as to which dubiety exists: from the original *D. myriantha* of the Malay Archipelago, particularly that of the Philippines, the Peninsular *D. myriantha* which extends into Siam manifests certain differences, which may eventually prove to be specific: the other two Malayan species do not extend eastward from the Peninsula.

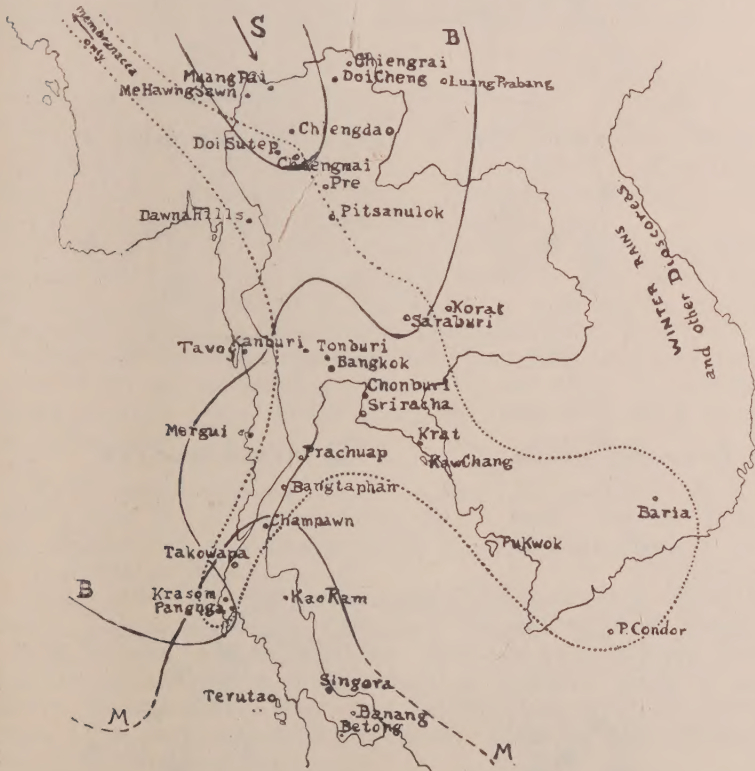
The meteorologists who indicate that the hill-country east of the Gulf of Siam is wet, attribute a considerably smaller rainfall to the rice-plain of Bangkok. In this rice-plain there occurs in abundance the *Dioscorea* named by us *D. oryzetorum*. Of the sixteen gatherings of this plant seen so far, all with three exceptions come from the adjacent circles of Prachinburi and Krungtep: these show that it varies greatly in the width of its leaves, but that the forms which differ in shape of leaf grow in intimate association. As a species, *D. oryzetorum* is very near *D. glabra* Roxb., which as part of its distribution is abundantly found in another rice-plain—the rice-plain of Bengal. But *D. oryzetorum* is not the familiar *D. glabra* of Bengal; nor is it the glabrous *Dioscorea* of Penang and the adjoining parts of Kedah, generally accepted as a form of *D. glabra*; nor is it the plant of south-eastern China known as *D. glabra* var. *longifolia*: its fruits are smaller than in any of these.

The map (p. 227) shows the parts of Siam from which these *Dioscoreas* have been recorded. In the north the penetration of those Siamese *Dioscoreas* which are characteristic of the Shan Hills and Yunnan is indicated by a line about the arrow S. A second line, B-B, indicates the depth to which *Dioscoreas* characteristic of Burma penetrate. In the south a line, M-M, shows the proved penetration of those characteristic of the Malay Peninsula. The Shan species are:—*D. velutipes* and *D. kamoonsensis*, to which *D. pseudo-nitens* may be added. The Burmese species are:—*D. Prazeri*, *D. birmanica*, *D. Arachidna*, *D. Hamiltonii* and *D. decipiens*. The Malayan species are:—*D. myriantha*, *Dioscorea* sp. no. 19 below and *D. orbiculata*.

A dotted line on the same map bounds an area wherein are found species not limited to Siam, but characterising hilly country partly within it. These are:—*D. daunaea*, *D. Pierrei* and *D. brevipetiolata*;

to which *D. membranacea* is added, but it is in distribution transitory towards the species of Burma. As it has proved impossible to give in the first map much information regarding the distribution of the species of the fourth group, four small maps showing where they have been found have been added (p. 228).

Phenological indications are meagre. Both in the extreme north and at the head of the Gulf of Siam, *D. bulbifera* flowers as the southern monsoon weakens. A group of species of the section *Lasiophyton*—*D. Kerrii*, *Collinsae*, *Arachidna*, *kamoonensis*, *Pierrei*, *pentaphylla*—flower, when found in flower at all, at the same period or a little earlier: but the distinctive *D. hispida*, which Uline has regarded as representing a section apart from those just enumerated, flowers in the same areas in April, May, June and even July; in April often beginning to flower before the leaves expand and in this respect behaving as the Chinese *D. Hemsleyi* Pr. and Burk., often



Map of the Siam peninsula showing the depth of penetration of the *Dioscoreas* characteristic of the Shan Hills (S), of Burma (B-B), of Malaya (M-M). The dotted line indicates the area in which occur *D. daunacea*, *D. Pierrei*, *D. brevipedunculata* and *D. membranacea*, except that the last extends to the southern Chin Hills beyond the map (see figs. p. 228).

does. The species of the section *Shannicorea*, met with only in the extreme north of Siam, flower in July. Those of the section *Stenophora* show some diversity. In the Payap circle *D. birmanica* was found in flower in May—the month in which it flowers in Burma; but *D. membranacea*, found in flower in the Payap circle in July, was found in the Ayuthia circle in September. In the Ayuthia circle *D. Prazeri*, which flowers in Burma and in Northern India in or before the rains—June to September—was gathered, not only before the rains, but only just out of flower as late as November. Then *D. daunaea*, a species whose sectional position is somewhat



Distribution of *D. daunaea*, *D. Pierrei*, *D. brevipetiolata* and *D. membranacea*.

doubtful, found in flower in the Amherst district of Tenasserim in March, and in the Siamese circle of Sritamarat in February, was obtained in flower in the circle of Chantaburi in November. All the species of the section *Enantiophyllum*, wherever found in Siam, flower between August and January and ripen their seeds before the dry season is over. But the *Dioscorea* here named *D. paradoxa*, which has a capsule like that of an *Enantiophyllum*, was met with in the circle of Ayuthia with ripe fruit in August, and may therefore have been in flower when the rainy season began.

We gratefully thank Dr. F. G. A. Kerr, Dr. Eryl Smith, Mrs. D. J. Collins, Professor W. G. Craib and Dean E. D. Merrill for information kindly communicated. Most of the specimens quoted are represented in the Herbarium of the Royal Botanic Gardens, Kew: a few not there are to be found in the Botanic Gardens, Singapore, and others in the Herbarium of the University of California at Berkeley.

Section *Stenophora*.

1. *D. birmanica* Pr. & Burk. in Jour. Asiatic Soc. Bengal, 73, (1904), p. 185 and N.S. 10, (1914) p. 13: Craib in Kew Bull., 1912, p. 407: R. Knuth in Engl. Pflanzenreich, iv-43, (1924), p. 186. *D. rangunensis* R. Knuth, in op. cit. p. 320.

Circle of PAYAP. Salween basin, Mè Surin, Mè Hawng Sawn, on old clearing at about 500 m., with flowers in May, Kerr 5456! Doi Sutep, in scrub jungle at nearly 330 m., with fruit in August, Kerr 1326! Circle of PITSANULOK, Pitsanulok town, Groff 6078!

Distrib. This coarse species is very characteristic of the moister parts of Burma, but seems not to pass far into Siam: has not been found in south Siam, Lower Siam, or Tenasserim south of the Amherst district.

2. *D. membranacea* Pierre in Herb. Paris: Craib in Kew Bull., 1912, p. 407 (name only): Pr. & Burk. in Jour. Asiatic Soc. Bengal, N.S. 10, (1914) p. 13: R. Knuth in Engl. Pflanzenreich, iv-43, (1924) p. 315.

Circle of PAYAP. Doi Sutep, in mixed jungle at 400 m. with male flowers in July, Kerr 1245! Chiengmai, Mè Hia, in mixed jungle at 330 m., with half-ripe fruits in July, Kerr 1951! Circle of AYUTHIA. Saraburi, Muak Lek, on limestone hill at about 400 m., with male flowers in September, Kerr 9152! Circle of SURAT. Chumpawn, Bang Song, on limestone hill at 120 m., sterile in May, Mohamed Haniff and Mohamed Nur 4230!

Distrib. broken: was found first in the Pakokku Chin Hills, an outlying locality: extends from Siam into Cambodia and Lower Cochin-China.

3. *Dioscorea (Stenophora) Rockii* Prain et Burkill, sp. nov.; cum *D. membranacea* Pierre capsulis omnino congruit: differt foliis integris.

Rhizoma et pars caulis ab eo exorta desunt. *Caulis* distans glaber, leviter striatus, inermis, sinistrorsum volubilis. *Folia* alterna, glabra, elongato-cordata, in apicem angustata, majora 10 cm. longa, 6 cm. lata, 9-nervia: areola intranervia clausa interior oblanceolata; areola a nervorum paribus alteris amplexa elliptica: pagina superior hebes, nervis nervulisque distinctis; pagina inferior quam superior nitentior, nervis elevatis, nervulis distinctis: petiolus tenuis, 4 cm. longus, basi aliquo modo puberulus. *Flores* ♂ ignoti. *Flores* ♀ in racemis 12 vel plures: axis puberulus vel glabrescens, striatus: bracteae longe lanceolatae. *Sepala* anguste ovata. *Petala* similia, paullulo minora. *Capsulae* resipientes, nitentes, flavo-fuscescentes, apice truncato-retusae, basi subcordatae: pedicellus 5-7 mm. longus: alae 17-20 mm. longae, 12-16 mm. latae, margine rotundatae praesertim oblique rotundatae. *Semina* circumcirca alata: ala hyalino-lactescens, 12-15 mm. diametro: nucleus reniformis.

Circle of PAYAP. Rain-forests on the lower slopes of Doi Chang, near Hui San, in fruit in January, *Rock* 1721 !

It may prove possible to regard this as a variety of *D. membranacea*.

4. **D. Prazeri** Pr. & Burk. in Jour. Asiatic Soc. Bengal, suppl. to 73, (1904) p. 2, and N.S. 10, (1914) p. 15: R. Knuth in Engl. Pflanzenreich, iv-43, (1924) p. 175: Pr. & Burk. in Kew Bull., 1925, p. 66: Burk. in Rec. Bot. Survey India, 10, (1925) p. 387. *D. Clarkei* Pr. & Burk. in Jour. Asiatic Soc. Bengal, N.S. 10 (1914) p. 15. *D. sikkimensis* Pr. & Burk. in the same, suppl. to 73 (1904), p. 3 and N.S. 10, (1914) p. 16.

Circle of AYUTHIA. Saraburi, Muak Lek, on rocky limestone hill at about 300 m. and 400 m., with male flowers and with young fruit in September, *Kerr* 9144 ! 9158 ! and also with flowers in March, *Marcan* 741 ! Circle of PUKET. Pangnga, Pulau Seng Pinang, in lat. 8° 20' N., with fruit in December, *Mohamed Haniff and Mohamed Nur* 4029 ! Pangnga, on Pulau Tebun, male and just out of flower in November, *Mohamed Haniff and Mohamed Nur* 3599 !

Distrib. along the foot of the eastern Himalaya between long. 84° 30' E. under Central Nepal, and the Abor Hills in long. 95° 20' E., thence southwards through Upper Burma, the Shan Hills and into Siam. Further, a specimen (*Ichebesta* 18!) from the extreme north of the Malay State of Perak may belong.

Section **Stenocorea**.

5. **D. daunaea** Pr. & Burk. in Jour. Asiatic Soc. Bengal, N.S. 4, (1908) p. 450 and 10 (1914) p. 12: R. Knuth in Engl. Pflanzenreich iv-43, (1924) p. 191.

Circle of CHANTABURI. Krat, Baw Rai, 1600 m., with male flowers in November, *Kerr* 9495 ! Circle of NAKAWN SRITAMARAT. Kao Ram, at about 800 m., with male flowers in February, *Dr. Feryl Smith* 502 !

Distrib. This species was obtained first in the Dawna Hills of the Amherst district of Tenasserim, some fifteen miles west of the Siamese frontier: and is now recorded from Siam. Unfortunately the female plant is unknown. All three gatherings have been made in different dry-season months,—February, March and November.

We correct ourselves regarding its section. Better material of *D. stenomeriflora* Pr. & Burk. than we possessed when we described it, shows that its stems twine to the left, and that in the male inflorescences it, *D. daunaea* and *D. keduens* Pr. & Burk. are so similar as to be of one section; with them we place tentatively *D. Ridleyi* Pr. & Burk., of which male flowers remain unknown.

Section **Shannicorea**.

6. **Dioscorea (Shannicorea) pseudo-nitens** Prain et Burkill, sp. nov.; a *D. nitenti* Pr. et Burk. capsulis multo majoribus facile distinguitur.

Tuber annuum, ut videtur singulum, in terram descendens, verisimiliter 30 cm. et ultra longum, plus minusve 1 cm. diametro. *Caulis* inermis, laevis, tenuis, sinistrorsum volubilis. *Folia* alterna, ovato-cordata aut suprema triangulari-ovata, ad 10 cm. longa, ad 5 cm. lata, 7-nervia: areola intranervia clausa interior late lanceolata, basi acuta, apice acuminata: areola a nervorum paribus alteris amplexa ovata vel in foliis maximis a basi truncato ovata: pagina superior vix nitens, nervis conspicuis, nervulis distinctis; pagina inferior laevis, nitens, nervis elevatis, nervulis distinctis subelevatis: petiolus ad 3 cm. longus. *Flores* ♂ in cymulis glomerati: et cymulae in inflorescentiam spiciformem ad 30 cm. longam compositae: axis glaber, alatus: bracteae ovatae, longe-acuminatae, 1-2 cm. longae, glabrae. *Sepala* elongato-triangularia, acuta, 1.5 mm. longa. *Petala* ovata, obtusa, sepalis paullulo breviora. *Stamina* sex, in marginem disci inserta, incurvata, aequalia: antherae filamentis paullulo longiores. *Flores* ♀ ad 12, spicati, ad anthesin bracteis longe acuminatis breviores, bracteolis linearibus aequilongi. *Sepala* ovata, acuta, 1.5 mm. longa. *Petala* similia, paullulo breviora. *Staminodia* minuta. *Capsulae* reflexae, apice obcordatae: pedicellus ad 7 mm. longus: alae nitentes, 25 mm. longae, semi-obovatae, 10 mm. latae. *Semina* apicem versus alata: ala rufo-castanea.

Circle of PAYAP. Chiangmai, Mè Chem, in evergreen forest at about 1000 m., with male flowers and also in fruit in July, *Kerr* 6279 !

This species is readily distinguishable from *D. nitens* by its fewer and much larger capsules.

7. **D. velutipes** Pr. & Burk. in Jour. Asiatic Soc. Bengal, N.S. 10, (1914) p. 19: R. Knuth in Engl. Pflanzenreich, iv-43, (1924) p. 320.

Circle of PAYAP. Doi Chiengdao, 1600-1800 m. in open rocky forest, with male flowers in July, *Kerr* 5581 !

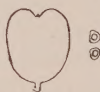
Distrib. Southern Shan States.

Section *Combilium*.

8. *D. esculenta* (Lour.) Burk. in Gard. Bull. Straits Settlements, 1, (1917) p. 371, and 2, (1919) p. 159, and 3, (1923) pp. 4 and 7. *D. aculeata* Linn., Herb. Amboin. (1754) p. 23, but not in Sp. Plant., (1753) p. 1033: Pr. & Burk. in Jour. Asiatic Soc. Bengal, N.S. 10, (1914) p. 19: R. Knuth in Engl. Pflanzenreich, iv-43, (1924) p. 189. *D. tiliaefolia* Kunth, Enum., 5, (1850) p. 401: R. Knuth in op. cit., p. 188.

Circle of PAYAP. Doi Sutep, *Groff* 6028! *Kerr's collector*! Circle of PRACHINBURI. Sriracha forest, wild but not plentiful, with female flowers in June, *Mrs. D. J. Collins* 256! 1045! Chonburi, tubers cultivated in Bangkok and flowered there, male, in July, *Kerr* 11021! Circle of AYUTHIA. Saraburi, at Muak Lek in scrub at about 200 m., with female flowers and a nearly mature capsule in August, *Kerr* 9051!

Distrib. This species is cultivated throughout the Asiatic Monsoon area and eastwards to Tahiti; westwards in the Mascarene Islands, West Africa and the West Indies. Hitherto there have been only the most inadequate indications as to its origin: for though it has been recorded as wild in several parts of the Monsoon area, only male plants have been obtained, and always in regions of shifting cultivation of which certainly at times, if not upon most occasions, they are relics. Female flowers appeared on a plant in the Honourable East India Company's Garden, Calcutta, in 1815, the origin of which is unknown: and that was the only female plant seen by any botanist until Dr. Kerr and Mrs. Collins obtained others in Siam. Attached to one of the specimens is the fully grown capsule with imperfect seeds figured here. The appearance of the capsule confirms the placing of this species in a section of its own; and Siam, as being the country wherein fruiting is most nearly achieved in a wild state, now appears likely to be within the region where it took origin.



Dioscorea esculenta. A capsule and immature seeds ($\times \frac{1}{2}$).

The Chiangmai and the two Doi Sutep specimens are flowerless, and there is no means of ascertaining that they are not relics of shifting cultivation. The Saraburi specimen which bears the only known capsule, possesses spines upon its roots exceeding 5 cm. in length and on account of this protection is what a wild self-sufficient plant should be. More can scarcely be said yet.

It is probable that *D. esculenta* is cultivated in every Circle of Siam. It is well known to the Siamese as "man mung".

Mrs. Collins supplies information regarding its mode of occurrence about Sriracha. The villagers cultivate a race of it that they

call "man áwn": but this name, as it means "small yam", may not be restricted to the race. They boil the yams, as also the yams of other Dioscoreas, with palm sugar and coconut. They dig also in the forest the tubers of this species, and distinguish two races as "man-i-múng peng" or wild man-i-múng, and "man-i-múng cheurk" or stringy man-i-múng. The first they consider a great delicacy, and Mrs. Collins regards it as a very good substitute for the potato. It is available in December and January; and perhaps the smallness of the supply is a consequence of an excessive search for it. Over the edible tubers the spiny roots extend and Dr. Kerr indicates that the longer spines may rise above the surface of the soil as caltrops.

Burma possesses a race of *D. esculenta* very like "man-i-múng peng," which the Burmese quaintly call "wet-ka u" or pig-cut-off tuber: those who can, should enquire if they be identical. But in Burma it is a cultivated race.

Section **Opsophyton**.

9. **D. bulbifera** Linn., Sp. Plant., (1753) p. 1033: Craib in Kew Bull., 1912, p. 407: Pr. & Burk. in Jour. Asiatic Soc. Bengal, N.S. 10, (1914) p. 26 and in Kew Bull., 1919, p. 340: R. Knuth in Engl. Pflanzenreich, iv-43, (1924) p. 88, excluding the synonyms *D. eburnea* and *D. eburina* from Loureiro. *D. latifolia* Benth. in Hook. Niger Flora, (1849) p. 535: R. Knuth in op. cit., p. 87. *D. korrorensis* R. Knuth in op. cit., p. 190.

Circle of PAYAP. Chiengrai, Mê Yang Min, 750 m., with male flowers in October, *Winit* 794! Mûang Hawt, 250 m., with male flowers in October, *Kerr* 2206! Doi Sute, in evergreen jungle 900 m., with male flowers in October, *Kerr* 3441! Chiengmai, 330 m., with fruit in November, *Kerr* 1529 b! and without altitude, *Kerr's collector*! Circle of MAHARAT. Prê, 170-270 m., with male flowers, but no date, *Vanpruk* 127! Circle of PRACHINBURI. Sriracha forest at Chak Kaw, with male flowers in October, *Mrs. D. J. Collins*, 981! Hup Bawn near Sriracha, with male flowers in September, *Mrs. D. J. Collins* 1039! and in the lower parts of the Sriracha forest, with male flowers in September, *Mrs. D. J. Collins* 983! Circle of KRUNGTEP. Bangkok, in scrub near sea-level, with male flowers in November, *Kerr* 3870! and with female flowers in October, *Marcan* 421! 452! Paklat near Bangkok, *Marcan* 1031! Circle of RACHABURI. Prachuap, Kao Luang, at about 1000 m., common in evergreen forest, with male buds in July, *Kerr* 10841!

Distrib. throughout the Asiatic Monsoon area, northward to Japan, through the Pacific Islands; westwards in tropical Africa, where it has a variety which has been taken in cultivation to the Americas (*D. latifolia* Benth., *D. anthropophagorum* A. Chev.).

It furnishes a not-inconsiderable supply of food to various backward races in the East, and is also a famine food. The Siamese who call it "man nok" may at times eat it, steamed or curried, when in November the vines wither, but perhaps when better is not

to be had. The Laos in the extreme north of Siam, Luang Winit says, do not eat it: they call it "maham pao".

Section **Lasiophyton**.

10. **D. Kerrii** Pr. & Burk. in Jour. Asiatic Soc. Bengal, N.S. 10, (1914) p. 20: Craib in Kew Bull., 1912, p. 407 (name only): R. Knuth in Engl. Pflanzenreich, iv-43, (1924) p. 138.

Circle of PAYAP. Doi Sutep, 470 m., with male flowers in September, *Kerr* 1404 !

Distrib. only known from this collecting.

11. **Dioscorea (Lasiophyton) Collinsae** Prain et Burkill, sp. nov.; a *D. pentaphylla* Linn. differt foliis minoribus levioribus nec rubellis, floribus masculis magis aggregatis.

Tubera esculenta, sed forsan insipida, a nobis non visa. *Caules* inermes, tenues, sinistrorsum volubiles, seu penna corvina crassi, minutissime pubescentes et propter pilos ad innovationes pallide rufo-straminei. *Folia* alterna, trifoliolata: petiolus parce pubescens, ad 2.5 cm. longus: foliolum medium obovatum, abrupte breviter acuminatum, plus minusve 9 cm. longum, 3.5 cm. latum, penninerve; foliola lateralia dimidio late semi-ovata, dimidio semi-cordata: pagina superior glabra, nervis distinctis: pagina inferior in nervis majoribus exstantibus parce pubescens: petioluli 2-3 mm. longi. *Flores* ♂ in racemis spiciformibus 30-50-ni: racemi racemosim in inflorescentias 16 cm. attingentes compositi: axis pilis rufo-aurantiacis parce pubescens, lineatus: bracteae flores amplexantes, abrupte acuminatae: pedicelli 0.5 mm. longi. *Sepala* obovata, 1 mm. longa. *Petala* aequilonga, subspathulata. *Staminodia* quam stamina longiora. *Flores* ♀ ignoti.

Circle of PRACHINBURI. Sriracha, in the lower parts of the forest, both in bud and with male flowers in October, *Mrs. D. J. Collins* 267 ! (type), 268 ! Also without locality, *Bradley* !

It is necessary, for furthering the study of the section of *Dioscorea* to which this species belongs, to use characters of a somewhat ill-defined unsatisfactory nature: and *D. Collinsae* is no exception: it is not clearly marked. By its yellow tint in the herbarium it suggests *D. Kerrii* Pr. & Burk., but as far as is known the latter always has simple leaves. It lies between this endemic species and *D. pentaphylla* Linn., and is quite distinct from that other close ally of *D. pentaphylla*, namely *D. Pierrei*, which occurs in Siam.

12. **Dioscorea (Lasiophyton) pseudo-tomentosa** Prain et Burkill, sp. nov.; a *D. tomentosa* Heyne foliis tenuissimis pro portione latioribus distincta.

Tubera ignota. *Caulis* distans inermis, tenuis, sparse albotomentosus, dein subglabrescens, sinistrorsum volubilis. *Folia* alterna, trifoliolata, tenuissima: petiolus ad 2.5 cm. longus, albo-pubescent: foliolum medium obovatum vel obovato-orbiculare, apice mucronulatum, ad 5 cm. longum, ad 4.5 cm. latum, penninerve: foliola lateralia dimidio semi-obovata dimidio late semi-

ovata, ad 5 cm. longa, ad 3.5 cm. lata: pagina superior parcissime pilis albis mollibus obsita, nervis conspicuis: pagina inferior albotomentosa, nervis majoribus elevatis: petioluli 5 mm. longi. *Flores* ♂ plus minusve 25-ni in racemis spiciformibus distributi: racemi in inflorescentias ad 25 cm. longas racemosim compositi: bracteae flores amplectentes, late ovatae, acuminatae, pubescentes: pedicelli 1-2 mm. longi. *Sepala* ovato-orbicularia, 1 mm. longa, dorso pubescentia, margine ciliata. *Petala* late spathulata, glabra, sepalis fere aequilonga. *Staminodia* anguste spathulata, petalis aequilonga. *Stamina* tria breviora. *Flores* ♀ ignoti.

Circle of AYUTHIA. Saraburi, Muak Lek, Kao Sisiat A, with male flowers in July, Noe 102 !

At first sight this recalls *D. tomentosa* Heyne: but it appears to be a much weaker plant, with very thin foliage. It is desirable that we should see more material of it.

13. *D. Arachidna* Pr. & Burk. in Jour. Asiatic Soc. Bengal, N.S. 10. (1914) p. 21: R. Knuth in Engl. Pflanzenreich, iv-43, (1924) p. 139. *D. pentaphylla* Linn. var. near var. *Jacquemontii* Craib in Kew Bull., 1912, p. 407.

Circle of PAYAP. Doi Sutep, in mixed jungle, 400 m., with young fruit in October, Kerr 1450 ! Circle of AYUTHIA. Saraburi, Muak Lek, in open evergreen jungle at about 200 m., with male flowers in September, Kerr 9121 !

Distrib. This species was described from plants collected in the hill-forests south of the Brahmaputra valley. Although they were sterile, we ventured to give the plant a name, as we were acquainted with it alive, and it has an economic interest. Now that we have male flowers and young fruit from Siam, we believe that we can recognise it in an immature fruiting specimen from the southern face of the Khasia Hills, so that its distribution is from these hills, eastwards within India, and forward into the north of Siam. The Khasia plant came from the Boga Pani at about 1300 m., and was collected by C. B. Clarke (44881 b).

The dimensions of the largest leaves of the Siamese specimens are 9.5 by 5 cm. In all points, but their greater size, they agree with the leaves obtained in the Nowgong and Haflong hills. The male flowers are small and numerous, on spike-like racemes arranged racemosely along inflorescences that attain 22 cm. in length. Sometimes in a leaf-axil there are two of these inflorescences, the lower much smaller than the upper. The spike-like racemes have the lowest 4-5 mm. sterile; in all they are up to 30 mm. long, and bear upwards of 70 flowers: the axis is angled, very minutely hairy, the hairs reddish, but so minute as not to give a reddish colour to the plant. The bracts are orbicular-acuminate, folded around the bud completely and embracing the flower, 1 mm. long. The sepals are broadly elliptic, glabrous, scarcely 1 mm. long. The petals are equally long, but narrower than the sepals, rounded above. The staminodes are rather more than half as long as the petals and are

slightly constricted at mid-length: the stamens are shorter, the broad anther equalling the filament in length. The gynoecium is a small cone. The capsules are produced in spikes about 15 cm. long, to the number of 20 or more, and are reflexed, but scarcely completely so: they are 18 mm. long and the wings are 5 mm. wide.

14. **D. kamoonsensis** *Kunth*, Enum., 5, (1850) p. 395: Craib in Kew Bull., 1912, p. 407: Pr. & Burk. in Jour. Asiatic Soc. Bengal, N.S. 10, (1914) p. 21. *D. kumaonensis* Hook. fil., Fl. Brit. Ind., 6, (1892) p. 290: R. Knuth in Engl. Pflanzenreich, iv-43, (1924) p. 140. *D. Burkilliana*, *D. Engleriana*, *D. firma*, *D. mengtezana*, *D. rotundifoliolata* and *D. subfusca*, R. Knuth in op. cit., pp. 140-143. *D. pentaphylla*, var. *kamaonensis* Uline ex R. Knuth in op. cit., p. 140.

var. **straminea** Pr. & Burk. in loc. cit.

Circle of PAYAP. Doi Suteb, in evergreen forest, 1330 m., with male flowers in September, *Kerr* 2712! and in open jungle at 1400 m., with male flowers in September, *Kerr* 1374!

Distrib. of the species, from a centre in China, where it extends through Yunnan into Kweichow and Hupeh, westwards along the Himalaya to Kumaon and southwards into northern Burma, and northern Siam.

15. **D. Pierrei** Pr. & Burk. in Jour. Asiatic Soc. Bengal, N.S. 10, (1914) p. 22: R. Knuth in Engl. Pflanzenreich, iv-43, (1924) p. 144.

Circle of PRACHINBURI. Sriracha forest at Chak Kaw, with male flowers in November, *Mrs. D. J. Collins* 1002! Nong Kaw forest, in fruit, *Mrs. D. J. Collins* 628! Circle of PUKET. Pangnga, Pulau Tebun, the male flowers just over, and with fruit in November, *Mohamed Haniff and Mohamed Nur* 3593! 3607!

Distrib. in Cochin-China and Siam. The deep-burying tubers, *Mrs. Collins* says, are dug up by woodmen and eaten to quench thirst. They descend to a depth of 1.25 m., and are mature in October and November. The tuber is called "man nám" or water tuber.

16. **D. pentaphylla** *Linn.*, Sp. Plant., (1753) p. 1032: Craib in Kew Bull., 1912, pp. 407 and 408: Pr. & Burk. in Jour. Asiatic Soc. Bengal, N.S. 10, (1914) p. 23: R. Knuth in Engl. Pflanzenreich, iv-43, (1924) p. 145.

var. **siamensis** Pr. & Burk. var. nov.

Circle of PAYAP. Chiangmai at 300 and at 330 m. in scrub jungle, with female flowers in November, *Kerr* 2251! 2251a!; and in evergreen jungle at 660 m., with female flowers in September, *Kerr* 2701 (type), and without altitude, *Kerr's collector*!

var. **communis** Pr. & Burk. in loc. cit.

Circle of PAYAP. Doi Suteb at 1000 m., with male flowers in September, *Kerr* 1383! 1383a! Doi Chom Cheng, between 1500 and 1600 m., *Rock* 300!

Distrib. of the species; through the Asiatic Monsoon area, and to the remotest Pacific island groups. Through this wide area it appears in a number of varieties, some of which receive cultivation or half-cultivation for food. The variety *siamensis* is eaten, according to Dr. Kerr. Its tuber descends to 50 cm. below the soil and at that depth may remain tender, but the part from close to the surface of the ground in his specimen is very stringy. It is abundantly covered by bristly roots. According to Dr. Kerr it is one of the species called "man awn" by the Laos. By the narrowness of its leaflets (up to 16 cm. in length by 2 cm. in width) and the lesser amount of hair upon them it is distinguished from var. *malaica*.

17. **D. hispida** *Dennst.*, *Schluss. Hort. Malab.*, (1818) pp. 15, 20 and 33; *Merrill, Interpret. Rumph. Herb. Amboin.*, (1917) p. 148. *D. daemona* *Roxb.*, *Fl. Ind.*, 3, (1832) p. 805; *Craib in Kew Bull.*, 1912, p. 407. *D. triphylla* *Linn.*, *Herb. Amboin.*, (1754) p. 23, but not in *Sp. Plant.*, (1753) p. 1032; *Pr. & Burk. in Jour. Asiatic Soc. Bengal, N.S.* 10, (1914) p. 25; *R. Knuth in Engl. Pflanzenreich*, iv-43, (1924) p. 131, excluding all the African specimens and references thereto.

var. **reticulata** *Hook. fil.*, *Fl. Brit. Ind.*, 6, (1892) p. 289.

Circle of CHANTABURI. Kaw Chang, in scrub near sea-level, with male flowers in April, *Marcan* 1322! Kaw Chang, Klawng Nonsi, *Schmidt* 469, and upon the coast opposite to Kaw Salak, *Schmidt* 721 (both probably of this variety). Circle of KRUNG-TEP or else PRACHINBURI. "Gulf of Siam", *Finlayson in Herb. Ind. Or.* 5100! Circle of PRACHINBURI. Sriracha, with male flowers "from April to July", *Mrs. D. J. Collins* 255! and with fruit in October, *Mrs. D. J. Collins* 255 a! Sriracha, Bawn Dan, in a clearing, with male flowers in March, *Marcan* 135! Circle of RACHABURI. Bangtaphan, *Keith* 465! Circle of SURAT. Chum-pawn, Bang Song, in fruit in May, *Mohamed Haniff and Mohamed Nur* 4204!

var. **mollissima** *Pr. & Burk.* in loc. cit.

Circle of PAYAP. Muang Pai, in scrub, 600 m., *Kerr*! Foot of Doi Sutep, in mixed jungle, 330 m., with flowers in June, *Kerr* 681!

var. **scaphoides** *Pr. & Burk.* var. nov.

Circle of PUKET. Pangnga, Pulau Tebun, with fruit in November, *Mohamed Haniff and Mohamed Nur*, 3596!

var. **neo-scaphoides** *Pr. & Burk.* var. nov.

Circle of PAYAP. Chiangmai, in deciduous forest, 300 m., with male flowers in August, *Kerr* 5650! (type). Circle of RACHABURI. Kanburi, Baw Re, with male flowers in July, *Put* 195!

Distrib. of *D. hispida*; from the west side of India, with limits therein approximating to those of *D. pentaphylla*, but not in Ceylon, towards the east only as far as western New Guinea; so that it is absent from any of the Pacific islands: and it is absent also from the Andaman islands. In India proper it occurs as var. *daemona*: on the east of the Bay of Bengal, var. *reticulata* rules: var. *mollis-*

*sim*a is sparingly associated with var. *reticulata*: and the two varieties mentioned here for the first time—var. *scaphoides* and var. *neo-scaphoides*—likewise. Dr. Knuth, who does not know var. *mollissima* as such, quotes Kerr 68r as var. *reticulata*.

Further material may prove vars. *scaphoides* and *neo-scaphoides* to be one: but as the first is known in the female and the second in the male it would be rash to assume this. The rather small very long acuminate leaflets are the same in both. The male inflorescence in var. *neo-scaphoides* is strikingly small. The capsules of var. *scaphoides* differ from those of vars. *daemona*, *reticulata* and *mollissima* in being bluntly pointed.

We have spent much time in attempting to correlate the colour of the flesh of the tuber with other characters, but have failed. Although we know that the flesh is sometimes white and sometimes lemon-yellow, both in India where var. *daemona* occurs, and in Siam where var. *reticulata* so varies, we base no varieties upon colour.

As is well known, the Siamese call the tuber of *D. hispida* "man kloi" or "man koi". Both Mr. Marcan and Mrs. Collins adopt the first form, and record its use as food. Impoverished groups of men in the region where this *Dioscorea* grows often resort to it; and Mrs. Collins indicates that in the years towards the end of the World War when the price of rice in Siam went beyond their means, the tubers were extensively used. The plant with white-fleshed tubers is called, about Sriracha, "kloi khaw chow" and that with yellow flesh "kloi khaw neo". The leaves of the latter are said to be darker than those of the former: apparently as food they are alike. They are dug in October and November when the 15 metres-long vines begin to wither, and then they weigh up to three pounds. They are peeled and sliced: the slices are soaked in water,—sea-water preferably, otherwise in water that has been salted: after twenty-four hours, during which the water should be changed several times, they are placed under pressure, still in water, for another twenty-four hours: these two processes are repeated up to eight times, when the poison should have been removed. To test for this, a bit of the prepared food is incinerated, and if it is consumed quietly it is fit to be eaten.

A man poisoned by an insufficiently washed preparation "suffers from dizziness and sees red". Sugar and water are given as an antidote, and the discomfort may pass away in a day, or may last several days, or even prove fatal more or less rapidly.

The Siamese method of preparation differs in little from that used elsewhere. Thus the Lepchas of Sikkim soak the slices in a running stream. The people of Bali, in the time of Rumpf, roasted the tubers, peeled them, and coated them with ashes for twenty-four hours before soaking them in salt water, and dried them between each soaking. The Amboynese kneaded them under salt water. Others would bury them in ashes.

Section **Enantiophyllum**.

18. **D. myriantha** *Kunth*, Enum., 5, (1850) p. 382: Pr. & Burk. in Jour. Asiatic Soc. Bengal, N.S., 10, (1914) p. 38: R. Knuth in Engl. Pflanzenreich, iv-43, (1924) p. 271. *D. Koordersii* R. Knuth in op. cit., p. 292.

Circle of NAKAWN SRITAMARAT. Terutao, Telok Wau, with fruit in November, *Mohamed Haniff and Mohamed Nur* 7473 !

Distrib. through Malaysia to the Philippine islands. Dr. Knuth restricts the name *D. myriantha* to Philippine specimens, and applies the name *D. Koordersii* to one from Celebes: he does not know the plant as it grows in Java, Solor, Timor and southern Siam.

19. **Dioscorea** sp.,—a species which has been known to us sterile for ten years and found in several places, and has been cultivated by us: but we have failed to get flowers, and fruits also, unless Mr. Mohamed Haniff's no. 645 from Bukit Wang in Kedah be it. From Lower Siam to the neighbourhood of Kuala Lumpur is its known distribution in the Malay Peninsula, and we have obtained it from Sumatra,—Sibolangit between Medan and the Toba Lake.

Circle of PUKET. Pangnga, on limestone, *Mohamed Haniff and Mohamed Nur* 3868 ! Circle of SURAT. Tong Sang, *Mohamed Haniff and Mohamed Nur* 4286 ! Circle of PATTANI, Banang, at about 100 m., *Kerr's collector* !

Dr. Kerr calls it in Malay "ubi tanyo" and adds that the Malays eat it. It is eaten by the Sakai further south, where Father Ichebesta has collected it under the name of "hou".

20. **D. Hamiltonii** *Hook. fil.*, Fl. Brit. India, 6, (1892) p. 295, excluding the synonyms *D. ovata* Ham., and *D. alata* Griseb.: Pr. & Burk. in Jour. Asiatic Soc. Bengal, N.S. 10, (1914) p. 39: R. Knuth in Engl. Pflanzenreich, iv-43, (1924) p. 266.

Circle of PAYAP. Chiangmai, Doi Chang, in fruit in January, *Rock* 1723 ! not quite typical. Circle of AYUTHIA. Saraburi at Muak Lek, in a clearing at about 200 m., not cultivated, with male flowers in November, *Marcen* 1880 !, also a little doubtful.

Distrib. This species, probably one of the parents of the next, is found in north-eastern India, and extends southwards into Siam and Tenasserim, as well as westwards on the further side of the Bengal plains in Chota Nagpur and the Malabar Ghats.

Mr. Marcen calls it "man rák".

21. **D. alata** *Linn.*, Sp. Plant., (1753) p. 1033: Craib in Kew Bull., 1912, p. 406: Pr. & Burk. in Jour. Asiatic Soc. Bengal, N.S. 10, (1914) p. 39: Burk. in Gard. Bull. Straits Settlements, 1, (1917) p. 371; 2, (1918) p. 37; and 3, (1923) pp. 4 and 5: R. Knuth in Engl. Pflanzenreich, iv-43, (1924) p. 265. *D. Hamiltonii* Koorders, Excursionsflora Java, 1, (1911) p. 309 and 4, (1923) p. 261.

D. alata is generally cultivated throughout Siam and readily persists for a time after shifting cultivation. Finlayson in his "Mission to Siam" (written in 1822-23) p. 270 mentions a luxuriant crop of it on the island of Ko-kan (Kaw Kan, a mile to the west of Kaw Si-chang and opposite Sriracha): but unfortunately his text continues with a statement that there was brought to him a tuber weighing 474 lbs. and measuring 9 ft. in circumference, dirty white at the top and fibrous within: this certainly can have been no tuber of *D. alata*. However that he saw *D. alata* in cultivation in the year 1822 may be accepted.

From Sriracha, by Mrs. Collins' generosity, the Royal Botanic Gardens, Kew, has at present in cultivation races which the Siamese call "man mu-mi" or bear's paw tuber, "man luat-ki" or chicken's blood tuber, "man gnu" or snake tuber, and "man chow-maprow" or swelling coconut-germ tuber. All these, Mrs. Collins says, are grown in small quantities for domestic consumption. She has supplied dried specimens of additional races—"man sao" or "man tua mai" or female yam, and "man sao sermg" or "man tua pu" or male yam, these being wild about Sriracha, where their deep-going tubers are dug for food. In addition she mentions in a note a race called "man mu-seur" or tiger's paw tuber. The bear's paw tuber is white-fleshed and in shape broad, flattened and lobed in such a measure as to suggest the name. One may consider it as what the Shans call "man tin-mi", the words having the same meaning. The chicken's blood tuber, as its name indicates, is magenta-fleshed, and in shape is rather narrow and is lobed. The snake tuber is one of these very interesting races which recurve in the soil and are sometimes of considerable length. Once, says Mrs. Collins, she saw a tuber of it ten feet long and coiled in several tiers. Being something quite unusual, it had been brought to the Governor of Sriracha as a present. The swelling coconut-germ tuber is a race very like that to which Roxburgh gave the name *D. globosa*, with a layer of magenta immediately under the skin, but white below it.

"Man tua mai" is stated to have a smaller tuber than "man tua pu", and a less angled stem.

There is not much information regarding the occurrence of these yams in other parts of Siam. That the species runs wild in the Circle of Payap is attested by specimens from Doi Sutep at 370 m. in scrub jungle, with ripe fruits in January, *Kerr* 1528 a!, and Chiangmai at 330 m, in scrub jungle, with male flowers in November, *Kerr* 1528 b! and on Doi Chang, with ripe fruits in January, *Rock*!

Professor Rock's specimen is not quite typical, having slightly larger fruits and slightly more prominent veinlets in the leaves; but it is not possible to give it another name.

Dr. Kerr's no. 1528 b bears the vernacular name of "man keng chang".

Outside Siam, *D. alata* extends in cultivation through the

tropics. Its origin in the Indo-China region is discussed in the Gardens' Bulletin of the Straits Settlements 3, (1924) p. 105.

22. **Dioscorea (Enantiophyllum) kratica** *Prain et Burkill*, sp. nov.; species ex affinitate *D. alatae* Linn. et *D. persimilis* Pr. et Burk., sed foliis conspicue differt.

Tubera esculenta, a nobis non visa. *Caules* glabri, striati, penna corvina crassiores. *Folia* vernalia alterna; serotina opposita vel subopposita, majora e basi cordata longe lanceolato-ovata, abrupte acuminata, ad 24 cm. longa, ad 7 cm. lata, 7-nervia: areola intranervia interior clausa anguste oblanceolata, basi angustissima: areola a nervorum paribus alteris amplexa elliptica: pagina superior glabra, nervis primariis conspicuis, nervis secundariis distinctis subrectis, reti indistincto: pagina inferior glabra, nervis primariis exstantibus, alteris distinctis: petiolus ad 6 cm. longus: folia serotina longe-ovata. *Flores* ♂ ignoti. *Flores* ♀ in spicis quam folia longioribus: axis angulatus, glaber. *Sepala* ovata, vix 1 mm. longa. *Petala* sepalis aequilonga, apice obtusa. *Staminodia* minuta. *Capsulae* crassiusculae, umbrinae: apice obcordatae: pedicellus 4 mm. longus: alae margine subaeque rotundatae, 20 mm. longae, 20 mm. latae. *Semina* castanea, circumcirca alata, loculis conformia.

Circle of CHANTABURI. Krat, Baw Rai, in evergreen forest at about 50 m. above sea level, with ripe capsules in November. *Kerr* 9453! (type). Krat, Kao Saming, upon the edge of evergreen forest, likewise with ripe capsules in November, at 20 m. above sea-level, *Kerr* 9415!

Male flowers are wanted to establish the position of this species. It is found in a region of heavy rainfall and close to sea-level.

23. **D. brevipetiolata** *Pr. & Burk.* ex Craib in *Kew Bull.*, 1912, p. 407 (name only), and in *Jour. Asiatic Soc. Bengal*, N.S. 10, (1914) p. 38: R. Knuth in *Engl. Pflanzenreich*, iv-43, (1924) p. 287.

Circle of CHANTABURI. Kaw Chang, Klawng Kloi, at 50 m., with male flowers in September, *Kerr* 9243! Circle of PRACHINBURI. Sriracha, Nawng Kaw, on the edge of the railway-track, with young fruit in September, *Kerr* 2047! general in the Sriracha forest, with male flowers in October, *Mrs. D. J. Collins* 982! 1043!

Distrib. in the mountainous parts along the east coast of the Gulf of Siam, both in Siam and in Cambodia, and forwards into Lower Cochin-China. Dr. Knuth errs in interpreting us as stating that it grows on the sea-shore; but it is found in the coastal forest. Mrs. Collins calls it "man tien" or candle tuber, its long slender tubers, with creamy flesh, waxy after cooking, being dug and marketed in November when the vines wither. Dr. Kerr confirms the use, but calls it "man dong".

24. **D. glabra** *Roxb.*, *Hort. Beng.*, (1814) p. 72 (name only), and *Fl. Ind.*, 3, (1832) p. 803: Craib in *Kew Bull.*,

1912, p. 407: Pr. & Burk. in Jour. Asiatic Soc. Bengal, N.S. 10, (1914) p. 37 excluding var. *salicifolia*: R. Knuth in Engl. Pflanzenreich, iv-43 (1924) p. 277, excluding Arsin's specimen and var. *salicifolia*. *D. siamensis* R. Knuth, in op. cit. p. 281.

var. *vera* Pr. & Burk. in loc. cit.

Circle of PAYAP. Doi Sutep, in scrub jungle at 370 m., Kerr 1485! (the type of *D. siamensis*, R. Knuth). Circle of CHANTABURI. Kaw Chang, Klawng Nonsi, with male buds in September, Kerr 9165!

var. *grisea* Pr. & Burk. in loc. cit.

Circle of PUKET. Takowapa, Mohamed Haniff and Mohamed Nur 2072! Krasom, Mohamed Haniff and Mohamed Nur 3625! Pangnga, Pulau Tebun, Mohamed Haniff and Mohamed Nur 3573! 3600! 3622! 3625! Circle of NAKAWN SRITAMARAT. Singora, Kaw Yaw, Annandale!

Distrib. *D. glabra* occurs widely in the north-eastern parts of India, whence it spreads through Burma southwards, intergrading in southern Siam in a perplexing manner with *D. pyrifolia* Kunth. It is the commonest species of the section *Enantiophyllum* in the plains of Bengal, and thence extends westwards into the Circars and Chota Nagpur.

Mrs. Collins in 1925 sent to the Botanic Gardens, Singapore, a tuber labelled "man tien", which gave rise to a plant with male flowers on a zigzag axis such as *D. alata* and *D. brevipetiolata* possess. It suggests a hybrid of *D. glabra*.

25. **Dioscorea (Enantiophyllum) oryzetorum** Prain et Burkill, sp. nov.; inter affines colore luteo-viride statim insignis: quoad forma florum capsularumque *D. glabrae* Roxb. similis: capsulis quam in *D. glabra* minoribus; in latitudine foliorum variabilis

Tubera longe terram penetrantia, seu pollex crassa. *Caulis* glaber, inermis, laevis nisi ad basin ipsam ramorum lateralium inconstanter scaberulus. *Folia* (infima ignota) opposita, latissime quadrato-cordata, alia ovata, minima angusta e basi rotundata ovato-lanceolata vel lineari-lanceolata, in siccitate pallescentia, glaberrima, 5-7-nervia: areola intranervia clausa interior in foliis quadrato-cordatis anguste obovata, in foliis longe ovatis vel ovato-lanceolatis oblanceolata, in foliis lineari-lanceolatis linearis: areola a nervorum paribus alteris amplexa ambitu fere ut folia: pagina superior glabra, nervis distinctis: pagina inferior glabra, nervis majoribus elevatis, reti distincto: petiolus 2-4 cm. longus, gracilis. *Flores* ♂ in spicis 15-50-ni: spicae binae vel quaternae ad nodos in inflorescentias compositae: axis rectus tenuissimus, angulatus, ad 40 mm. longus: bractee laeves, pallidae, truncatae, rigidiusculae, ovatae: alabastra nunc aliquomodo prorsa, nunc subquadratum axi imposita, ad axin compressa. *Sepala* umbrina, ovata, et basi lata, 1 mm. longa. *Petala* oblanceolata, sepalis breviora, crassiora. *Stamina* sex: filamenta brevissima. *Flores* ♀ in spicis ad 30-ni distributi: axis angulatus: bractee ovatae.

Sepala late ovata, 1 mm. longa. *Petala* rotundata, crassa. *Staminodia* admodum parva. *Capsulae* porrectae, parvae, laeves, subglaucae: pedicellus 3-4 mm. longus: alae latiores quam semicirculares, ad 14 mm. longae, ad 11 mm. latae, apice paullulo semiobcordatae. *Semina* loculis conformia, circumcirca alata: ala castanea.

var. **latifolia** Prain et Burkill, var. nov. *Folia* ad 10 cm. longa, ad 7 cm. lata, e basi cordata quadrato-ovata.

Circle of CHANTABURI. Sai, Ban Tap, in fruit in December, Kerr 9689 ! Circle of PRACHINBURI. Sriracha forest, throughout, with male flowers in September, Mrs. D. J. Collins 984 ! (type of ♂). Circle of KRUNGTEP. Bangkok, on a ditch-bank, with female flowers in October, Marcan 1817 ! Tonburi, Wat Sing, by a ditch, with male and with female flowers in October, Kerr 9349 ! (type of ♀). Circle of SURAT. Kao Lao, at about 20 m. above sea level, in dry evergreen forest, Kerr 11135 ! Without locality, Bradley !

var. **mediifolia** Prain et Burkill, var. nov. *Folia* ad 8 cm. longa, ad 5 cm. lata, elongato-ovata vel ovato-lanceolata.

Circle of PRACHINBURI. Sriracha, with male flowers in October and in November, Mrs. D. J. Collins 266 ! 1044 ! Circle of KRUNGTEP. Tonburi, Wat Sing, by a ditch in scrub, with male and with female flowers in October, Kerr 9350 ! 9350 a ! Bangkok, in a hedge, with nearly ripe fruit in November, Kerr 9352 ! (type), and with male flowers in October, Marcan 1044 ! on a canal bank and a ditchside, with male flowers in October, Marcan 1826 ! 1827 ! and with female flowers in October, Marcan 1828 ! with half-ripe fruit in November, Marcan 1838 ! Circle of SURAT. Kao Lao, common in dry evergreen forest, Kerr, 11135a !

var. **angustifolia** Prain et Burkill, var. nov. *Folia* ad 7 cm. longa, ad 1 cm. lata, e basi rotundata lanceolato-linearia.

Circle of KRUNGTEP. Tonburi, Wat Sing, among bushes by a ditch almost at sea-level, with male flowers in October, Kerr 9347 ! Bangkok, with male flowers in October and November, Kerr 4508 ! 7870 ! 9353 ! (type). Marcan 451 ! Bangkok, Klawng Rangsit, in scrub, with fruit in January, Marcan 1606 !

We regret having to propose another species in the difficult group of *D. glabra*: but we have had much material of it through our hands. In common with the next two, it differs from the typical *D. glabra* Roxb., in the small size of its capsules. It may well be a species emerging under the peculiar conditions of the Bangkok plains, where in the dry weather the water-table sinks to a depth which would seem out of reach of such a *Dioscorea* as this, and where in the rainy season, though the actual precipitation is not very great, the soil is saturated by reason of the large volume of water in the rivers.

Dr. Kerr calls it "man nok", a name which Mrs. Collins applies to *D. bulbifera*, whereas she calls this "man mu" or hand-tuber, and "man doang" in different varieties, the first for var. *mediifolia* and the second for var. *latifolia*. She states that "man doang" is eaten steamed and in curries. Dr. Kerr records the same use as

being made of the tuber of *D. glabra* var. *vera*: it is probable that on the table one is as good as the other.

The tubers diverging in the soil, suggest fingers; thence the name "man mu". Mrs. Collins states that it is difficult to dig out the roots on account of the way in which they spread. It would be helpful if the botanists working in Siam could figure these tubers in a natural position.

26. *D. gracilipes* Pr. & Burk. in Kew Bull., 1925, p. 63.

Circle of PUKET. Pangnga, Pulau Tebun, in fruit in November, Mohamed Haniff and Mohamed Nur 3603 !

27. *D. calcicola* Pr. & Burk. in Kew Bull., 1925, p. 64.

Circle of PUKET. Pangnga, on a limestone hill at 170 m., Mohamed Haniff and Mohamed Nur 3974 ! Pangnga, Pulau Tebun, Mohamed Haniff and Mohamed Nur 3601 !

28. *Dioscorea* (*Enantiophyllum*) *stemonoides* Prain et Burkill, sp. nov.; species distincta calcaribus vel verrucis apice politis 1-3-nis ad basin petiolorum.

Tubera pluria, descenduntia, tenuiuscula. *Caulis* glaber, gracilis, inermis, dextrorsum volubilis. *Folia* inferiora alterna, elongato-cordata, ad 5.5 cm. longa, ad 3.5 cm. lata, superiora opposita minora, 7-nervia: areola intranervia interior clausa lanceolata vel oblanceolata: areola a nervorum paribus alteris amplexa ambitu fere ut folia: pagina superior glabra, nervis primariis distinctis, aliis obscuris: pagina inferior glabra, nervis primariis elevatis, aliis aliquanto distinctis: petiolus tenuis, ad 55 mm. longus, basi, si folia infima, calcaribus apice politis ornatus, si superiora invicem verrucis apice politis 1-3-nis. *Flores* ♂ ignoti. *Flores* ♀ spicatae: spicae pauciflorae, angulatae, capsulas 2-3 ferentes: axis 6-8 cm. longus, glaber: bracteae ovato-lanceolatae. *Sepala* matura haud visa. *Capsulae* laeves, griseo-fulvae, basi fere cordatae, apice obcordatae: pedicellus 3 mm. longus: alae rotundato-subquadratae, ad 17 mm. longae, ad 18 mm. latae. *Semina* castanea, circumcirca alata, alis castaneo-fuscis.

Circle of RACHASIMA. Korat, Chan Tuk, Kao Sisiat A, at about 400 m., climbing among limestone rocks, and bearing nearly ripe fruit in September, Kerr 9098 ! (type). Circle of AYUTHIA. Saraburi, Muak Lek, at about 300 m., growing in crevices of limestone rocks, sterile in September, Kerr 9098 a !

The affinity of this species seems to be with such species of the section *Enantiophyllum* as *D. glabra* Roxb., and *D. pyrifolia* Kunth: the multiple tubers suggest it. But no *Enantiophyllum* has as yet been detected with the gland-like processes which this possesses. Prickles occur in the same positions in many species; but the processes of *D. stemonoides* are not sharp, but blunt and polished: they are indeed more like the weak stipule-like processes found in a small group of species of the section *Stenophora*.

The fewness of the female flowers upon the spikes is suggestive of *D. paradoxa* which is described below; but there can scarcely be any close affinity between it and that species, seeing that the twining of the stem is reversed. But *D. calcicola* and *D. gracilipes* produce few capsules on each spike; and they apparently are closely allied.

29. ***D. orbiculata*** *Hook. fil.*, Fl. Brit. Ind., 6, (1892) p. 292: Pr. & Burk. in Jour. Asiatic Soc. Bengal, N.S. 10, (1914) p. 31: R. Knuth in Engl. Pflanzenreich, iv-43, (1924) p. 281.

Circle of PATTANI. Betong, at 200 m. in scrub, with male flowers in August, *Kerr* 7485!

Distrib. This species occurs from Dr. Kerr's Siamese locality southwards through the Malay Peninsula and in Sumatra (locality unrecorded) and in Dutch Borneo.

Dr. Kerr gives it the Siamese name of "man ta yong", and states that the tubers are considered edible.

30. ***D. decipiens*** *Hook. fil.*, Fl. Brit. Ind. 6, (1892) p. 293: Craib in Kew Bull., 1912, p. 407: Pr. & Burk. in Jour. Asiatic Soc. Bengal, N.S. 10, (1914) p. 31: R. Knuth in Engl. Pflanzenreich, iv-43, (1924) p. 287.

Circle of PAYAP. Doi Sutep, in mixed jungle at 400 m., *Kerr* 1449! Chiengmai, at 300 m. in deciduous forest, with male buds in August, *Kerr* 5651! Chiengrai, Mè Yen, at 430 m. in deciduous jungle, with male flowers in September, *Winit* 765!

Distrib. With its centre in Upper Burma, it extends (i) into the hills upon the south of the Brahmaputra, (ii) just into Yunnan, and (iii) just into the Laos territory at Luang Prabang, (iv) into Siam as indicated, and (v) towards the south it reaches the Tavoy district of Tenasserim.

Dr. Kerr records for it the Siamese name "man tung", and so also does Luang Winit. The latter adds that the tuber is edible.

Section uncertain.

31. ***Dioscorea inopinata*** *Prain et Burkill*, sp. nov.; species sectionis incertae, ab omnibus nisi *D. Brandisii* Pr. & Burk. distinctissima: spicis masculis solitariis praedita, cum petalis iis *D. bulbiferae* Linn. similibus sed brevioribus, cum foliis ab iis *D. bulbiferae* non longe dissimilibus: sed vero species longe distat.

Partes inferiores ignotae. *Caules* tenues, inermes, striati, dextrorsum volubiles. *Folia* alterna, e basi cordata ovato-lanceolata, acuminata, ad 9 cm. longa, 2.5-3.5 cm. lata, 7-nervia: areola intranervia interior clausa lanceolato-elliptica, areola a nervorum paribus alteris amplexa fere ambitu folii conformis: pagina superior hebes, laevis, nervis primariis distinctis, aliis paene invisibilibus: pagina inferior pallidior, nervis primariis vix vel paullulo elevatis, aliis indistinctis: petiolus perbrevis, 5-7 mm. longus, purpurascens. *Spicae* ♂ solitariae, rigidiusculae, ad 3.5 cm. longae, plus minusve

30-florae: flores quadratim dispositi: axis glaber, angulatus: bracteae ovato-lanceolatae, acuminatae, ad 1 mm. longae, basin floris subamplectentes, subscariosae: bracteolae ovatae. *Sepala* lanceolata, acuta, fere 2 mm. longa. *Petala* oblanceolata, acuta, fere sepalis aequilonga. *Stamina* sex, parva: antherae subrotundatae, filamentis longiores. *Flores* ♀ ignoti.

Circle of RACHABURI. Prachuap, Sam Roi, Yawt, on a rocky limestone hill at less than 50 m. above sea-level, with male flowers in July, *Kerr* 10978 !

This *Dioscorea* resembles *D. Brandisii* Pr. & Burk., in its flowers: and *D. Brandisii* we considered as possibly a hybrid between *D. bulbifera* and a species of the section *Enantiophyllum* such as *D. glabra* Roxb. But the stiff male spikes that we observe in *D. inopinata* are not like the branched spikes of *D. Brandisii*. Moreover we observed that *D. Brandisii* twines to the left in common with *D. bulbifera*, whereas we find *D. inopinata* to twine to the right in common with *D. glabra*. At present we have no authority for assuming that a hybrid between species of these two sections is possible; nor have we consequently any indication how the characters would blend. But if hybridisation be possible, *D. Brandisii* and *D. inopinata* could have their origins from the same two species. There is yet much to ascertain regarding them before any view can be established and above all we need their underground parts.

32. *Dioscorea paradoxa* Prain et Burkill sp. nov.; species distincta: capsulis cum iis sectionis *Enantiophylli* ad amussim quadrantibus, sed caulibus sinistrorsum volubilibus ab hac sectione longe distat: spicis foemineis unifloris apice subspinosi speciebus *Dioscoreae* omnibus adhuc descriptis statim differt.

Partes inferiores ignotae. *Caules* inermes, glabri, laeves, politi, seu penna corvina crassi, sinistrorsum volubiles, axillis foliorum alternis tantum fertilibus. *Folia* alterna, triangulari-cordata, breviter acuminata, ad 6 cm. longa, ad 5.5 cm. lata, glaberrima, 7-nervia: areola intranervia interior clausa elliptico-lanceolata: areola a nervorum paribus alteris amplexa ovata: petiolus laminae aequilongus vel longior, pergracilis. *Flores* ♂ ignoti. *Flores* ♀ solitarii, lateraliter in ramis molliter subspinosi positi: invicem ramus uni- vel bi-folius, ramus uniflorus: axis floriferus 1.5–2 cm. longus, laevis, apice aliquomodo induratus: bractea ovato-lanceolata: bracteolus longe distat in pedicello capsulae, ovato-triangularis. *Sepala* et *petala* matura non visa. *Capsulae* magnae, stramineae, basi truncatae, apice obcordatae: pedicellus 15 mm. longus, leviter curvatus: ala 25 mm. longa, 25 mm. lata, rotundata. *Semina* circumcirca alata, brunneo-ochracea, oculis conformia; nucleus 10 mm. longus, 7 mm. latus, subreniformis.

Circle of AYUTHIA. Saraburi, Hin Lap, climbing over bushes upon a rocky limestone hill, in great abundance, at 100 m. above sea-level, with ripe fruit in September, *Kerr* 9132 !

The capsules of this curious species suggest the section *Enantiophyllum* in that they free the seeds so that they glide out: but the direction in which the stems climb is contrary to that characteristic of that section. The underground parts and the male plant are required. Its morphology suggests that it is very distinct from all other known species.

XXXI.—DECADES KEWENSES PLANTARUM NOVARUM IN HERBARIO HORTI REGII CONSERVATARUM. DECAS CXVII

1161. *Delphinium Nortonii* Dunn [Ranunculaceae-Helleboreae]; species *D. coeruleo* Jacq. affinis, sed calcare brevior distincta.

Herba perennis 7–10 cm. alta, dense breviter hirsuta. *Caules* ex radice plures, uniflori. *Folia* longe petiolata, breviter vaginantia, orbicularia; radicalia 2–3 cm. diametro, palmatim tripartita, segmentis late cuneatis valde imbricatis breviter petiolulatis palmatim incisus laciniis obtusis; caulina similia, pauca, minora. *Flores* magni, violacei, inflato-globosi, extus pubescentes, cum calcare 4 cm. longi, 3 cm. diametro; pedunculi 4–5 cm. longi, bibracteolati, bracteolis lanceolatis vel foliaceis 0.5–1 cm. longis. *Sepala* ovato-rotundata, membranacea, venosa, imbricata. *Calcar* rectum, 1–1.5 cm. longum, gradatim attenuatum. *Petala* lateraliter bifida, aurantiaco-hirta; *posteriora* bidentata. *Staminum* filamenta glabra, inferne membranaceo-dilatata. *Carpella* 3, velutina.

TIBET. On sandy soil with a western aspect above Kampa Dzong, 12 miles north of Sikkim 5000 m., 17th June, 1922, *Major E. F. Norton* 369 (Mount Everest Expedition).

1162. *Parrya Finchiana* Dunn [Cruciferae-Arabideae]; similis *P. platycarpae* Hook. f. et Thom., sed pedunculis petiolisque dense pilosis distincta.

Herba perennis, dense breviter pilosa, 4–5 cm. alta. *Radix* longa, crassa, annulata, verticalis, apice in capita plura congesta ramosa. *Scapi* et flores singuli basi foliis cincti. *Squamae* extra folia scariosae, oblongae, acutae, ciliatae. *Folia* lanceolata, apice basique attenuata, ciliata, pilosa, 2 cm. longa. *Flores* congesti breviter racemosi, 1.5 cm. longi; pedicelli 5 mm. longi. *Sepala* linearia, 7 mm. longa, margine scariosa. *Petala* spathulata, violacea, in unguem longum flavum attenuata, 1.4 cm. longa. *Antherae* lineares. *Ovarium* oblongum; stylus brevis; stigmata brevissima, connata. *Siliqua* et semina non visa.

TIBET. Stony hillsides facing south east, along the Chongphu torrent, about 20 miles north east of Mt. Everest, 5700 m., 8th June, 1922. *Major E. F. Norton* 41 (Mount Everest Expedition).

The species is named in honour of Capt. George Finch of the Imperial College of Science who accompanied the Expedition and both as climber and naturalist contributed to its success.

1163. **Nototriche holoserica** A. W. Hill [Malvaceae]; species *N. compactae* A. W. Hill affinis, sed foliis multi-lobatis holosericis, calyce longiore, tubo corollae extus hirsuto praecipue differt.

Fruticulus depressus, dense caespitosus, pulvinatus, cinerascenti-tomentosus; caudex subterraneus, lignosus, firmus, ramosus. *Folia* arcte aggregata, imbricata; petiolus circiter 1 cm. longus; stipulae parte libera lineari-lanceolata, 3-4 mm. longa, cum petiolo utrinque incano-holoserico-stellato-tomentosa; lamina ambitu semi-circularis vel reniformis, subcarnosula, palmatim 7-9-loba, circa 3.5-5 mm. longa, 7-9 mm. lata, utrinque dense incano-holoserico-tomentosa, lobis 1.5-2.5 mm. longis 3-5 lobulatis, lobo medio 7-lobulato. *Calyx* urceolatus, 8-9 mm. longus, extus et lobi intus dense lanato-tomentosus, lobis triangulari-ovatis subacutis. *Corolla* alba vel pallide rosea, 8-9 cm. longa; petala obovata, rotundata, basi in tubum extus hirsutum circa 2.5-3 mm. coalita. *Carpella* 6-10, birostrata, 6 mm. longa, inferne breviter stellato-tomentosa, rostris 1.5-2 mm. longis dorso superne pilis longis stellatis instructis.

CHILE. Prov. Atacama: Vallenar; Cordillera Laguna Chica, 4200 m., *E. Werdermann* 264 (Jan. 1924); bleak slope north of Portezuelo de Laguna Chica, 4200 m., *Ivan M. Johnston* 5944; near Laguna Valeriano, Quebrada, just above the lake, common on silty and gravelly beaches, 4150 m., *Ivan M. Johnston* 6046 (Jan. 1926).

Dr. Ivan M. Johnston has sent four interesting specimens of *Nototriches* to Kew for determination; two of these from the Atacama desert are found to be a new species, allied to *N. compacta*, but differing especially in the more silky tomentum, the smaller lobulae of the leaf and the hairs on the outside of the calyx tube; they are said to be common in this region. *Werdermann* collected the same plant two years before. The other plants were collected in the Andes of North-western San Juan, Northern Argentina, at 4100-4400 m., and prove to be *N. transandina* A. W. Hill.

N. transandina is evidently closely related to *N. megalorrhiza* Philippi, and it may be found, when better material comes to hand, that these two plants will prove to be identical. Owing to the imperfect nature of Philippi's material at Kew and his meagre description (*Flor. Atacama* p. 11), it is not possible at present to consider the reduction of *N. transandina* to the earlier described species.

1164. **Microcos Brassii** Summerhayes [Tiliaceae]; affinis *M. grandiflorae* Burret, sed foliis minoribus glabris, nervis lateralibus foliorum utrinsecus 3-4, floribus minoribus satis distinguenda, et *M. Schlechteri* Burret a qua staminibus numerosis differt.

Arbor 9-12 m. alta. *Ramuli* teretes, longitudinaliter rugulosi, glabri, brunnei. *Stipulae* caducissimae. *Petiolus* 0.8-1.4 cm. longus, supra leviter applanatus, minute lepidotus, ceterum glaber. *Lamina* oblongo-elliptica, apice subito acuminata, summo apice obtusa, basi subcuneata, margine integra, 7.5-13 cm. longa,

3-5.5 cm. lata, subcoriacea, utrinque juventute minute sparseeque albido-puberula, demum glabra, laevis, concolor; costa media et nervi laterales supra inferne impressi superne subprominentes, subtus valde prominentes; nervi basales ad dimidium laminam ascendentes; nervi laterales utrinsecus 3-4, prope marginem arcuatim conjuncti, nervis tertiariis tenuiter reticulatis. *Inflorescentiae* terminales, paniculatae, angustae, 3-5 cm. longae, ramulis siccitate longitudinaliter sulcatis dense lepidoto-pilosis; flores 3-nati, triades pedunculo 4-7 mm. longo; foliola involucri alba caduca; pedicelli brevissimi, usque ad 1 mm. longi. *Alabastra* oblongo-ellipsoidea vel oblongo-obovoidea, 3-4.5 mm. longa. *Sepala* oblonga vel oblongo-elliptica, 4.5-5 mm. longa, apice obtusa, cucullata, margine superne valde inflexa, extra minute stellato-pilosula, intus breviter pubescentia. *Petala* cuneato-oblonga, apice emarginata, 2 mm. longa, utrinque puberula, ciliata. *Stamina* numerosa (circiter 30); filamenta linearia, 3 mm. longa, basi albido-pilosa. *Ovarium* conicum, dense breviterque pilosum, in stylum brevem glabrum exiens, triloculare, loculis biovulatis.

NEW GUINEA. Ihu, Vailala River, erect rain-forest tree 9-12 m. high with a close brown bark, Feb. *Brass* 949.

1165. ***Tephrosia egregia*** *Sandwith* [Leguminosae-Galegeae]; inflorescentia floribusque *T. Hassleri* Chod. revocans, foliolis apice saepius retusis brevissime apiculatis tantum supra glabratis, indumento alibi inconspicuo adpresso differt; foliis atque ramificatione necnon indumento ad *T. nitentem* Bth. approximans, tamen calycis forma stylo glabro stigmate penicillato longe distat.

Ramuli exstantes 15-20 cm. longi inflorescentia terminati, costato-angulati, inter costas late sulcati, ut foliorum rhachae densiuscule subappresse cinereo-pilosi; internodia 2-4 cm. longa. *Folia* usque ad 10 cm. longa, inferiora 6-8-juga, superiora 2-4-juga, superiora praesertim flores solitarios vel fasciculos paucifloros suffulcientia; petioli 0.5-1 cm. longi; rhachae internodia 0.6-1.2 cm. longa; petioluli dense adpresse albo-pilosi, 2 mm. longi; foliola oblanceolata vel inferiora saepe obovata, apice saepius retusa, nonnunquam rotundata, apiculo 0.5 mm. vix attingente, 1.8-4 cm. longa, 0.6-1.3 cm. lata, sursum gradatim majora, chartacea, supra glabrata vel sparsiuscule minute adpresse setulosa, subtus dense adpresse cinereo-pilosa; stipulae subulatae, usque ad 1 cm. longae, extra dense adpresse albo-pilosae. *Inflorescentia* dense subsericeo-pilosa, et terminalis racemiformis floribus superioribus solitariis inferioribus fasciculatis, et floribus solitariis, vel fasciculatis in axillis foliorum superiorum; bractae subulatae 5-8 mm. longae; pedicelli 6-7 mm. longi. *Calyx* extra dense cinereo-pilosus, intus minute pubescens; tubus campanulatus inter labium posticum et lobos ceteros 3 mm. longus, ad 5 mm. latus; dentes subulati, 2 superiores 5 mm. longi tum connati, 3 inferiores 7-9 mm. longi medio lateralibus longiore. *Corolla* magna speciosa, ad 1.8 cm. longa; vexillum lamina orbiculari extra satis dense

adpresse cinereo-pilosa intus glabra, ad 1.4 cm. longa, ad 1.6 cm. lata, ungue ad 3.5 mm. longo; alae glabrae, lamina obovata 1.3 cm. longa, ungue 2-3 mm. longo; carina glabra, ad 1.2 cm. longa, unguibus 2-2.5 mm. longis. *Stamina* in vaginam glabram fere 9 mm. longam connata, filamentis liberis glabris 3-5 mm. longis; stamen vexillare mediae vaginae usque ad 4-5 mm. connatum, aliter liberum. *Ovarium* disco cupulari glabro 0.5 mm. longo 1.3 mm. lato positum, dense adpresse albo-pilosum, ad 1 cm. longum, 1.2 mm. latum; stylus glaber, circiter 7 mm. longus, fructu maturescente manifeste applanatus subinduratus, stigmatibus pilis albis conspicue penicillato.

BRAZIL: Ceara, G. Bolland.

1166. **Astragalus Rockii** Marquand et Shaw [Leguminosae-Galegeae]; subgeneris *Pogonophaces* sectionis *Phyllolobii* nulli speciei nobis notae arcte affinis, ab *A. complanato* R. Br. ex Bunge leguminibus inflorescentiaeque pedunculis duplo vel triplo brevioribus, et ab *A. pycnorrhiza* Wall. inflorescentiis 3-7-floris floribus luteis, facile distincta.

Herba perennis. *Radix* valida, 3-4 mm. diametro, lignosa. *Caules* suberecti vel adscendentes, flexuosi, ramosi, ad 3 dm. longi, superne parce pubescentes, striati. *Stipulae* liberae, parvae, triangulari-subulatae, c. 3 mm. longae. *Folia* 2-3 cm. longa, 8-9 mm. lata, foliolis 7-9-jugis breviter petiolatis, obovatis vel subellipticis, saepe emarginatis, mucronatis, 4-5 mm. longis, 2-2.5 mm. latis, supra glabris, subtus glauco-pallidioribus pilis albis brevibus adpressis parce vestitis. *Racemi* 3-7-flori, numerosi, pedunculis breviter pubescentibus 2-3 cm. longis suffulti. *Bractae* anguste triangulares vel subulatae vix ad 3 mm. longae. *Flores* pedicellis brevibus suffulti; bracteolis minimis subulatis. *Calycis* tubus sparsissime nigro-pubescens, 2-3 mm. longus, dentibus aequalibus anguste subulatis c. 4 mm. longis densius nigro-pubescentibus. *Corolla* ochroleuca, c. 14 mm. longa. *Vexillum* suborbiculare, c. 10 mm. diametro, emarginatum, basi attenuatum. *Alae* anguste obovatae, c. 12 mm. longae, 4 mm. latae, apice rotundatae, basin versus breviter auriculatae. *Carina* c. 13 mm. longa, 4-5 mm. lata, apice fusca, oblique subtruncata. *Stamina* diadelphe. *Stigma* barbatum. *Legumen* turgidum, glaberrimum, subcomplanatum, oblongo-lanceolatum, dorso alte sulcatum, 1.3-1.5 cm. longum, 4-5 mm. latum, apice attenuatum, polyspermum.

S.W. CHINA. YUNNAN: Ngululo; dry loamy soil, eastern slopes of Likiang Snow Range, Yangtze watershed, 18 Sept., 1923, J. F. Rock 10745.

1167. **Oxytropis Malloryana** Dunn [Leguminosae-Galegeae]; affinis *O. tataricae* Cambess. habitu, sed pubescentia pilis longis sparsis nec sericeis densis adpressis differt.

Herba perennis, acaulis, pilis albis patulis conspersa. *Radix* longa, verticalis, multiceps. *Folia* basi congesta, 3-5 cm. longa, imparipinnata, 10-12-juga; foliola oblongo-ovata, obtusa, mar-

ginata, tenuiter involuta, 3 mm. longa; petioli 1-2 cm. longi; stipulae ovatae vel lanceolatae, obtusae, petiolo basi adnatae, venosae, saepe membranaceo-marginatae, ciliatae, 5 mm. longae. *Capitula* 4-5-flora. *Flores* purpurei, 6 mm. longi, bracteolis lanceolatis calyce brevioribus. *Calycis* tubus 2 mm. longus ut dentes et legumina pilis brevibus nigris adpressis indutus, dentibus lanceolatis tubo bis brevioribus. *Corolla* calyce sesquialongior; vexillum ovatum in unguem brevem attenuatum; alae aequilongae; carina alis brevior, apice acuta rostrata; filamenta inaequaliter libera. *Ovarium* sessile; stylus imberbis. *Legumen* lineare, uniloculare, sutura ventrale intrusa, 1-4 cm. longum.

TIBET. Stony slope facing south in Phung Chu (Arun) valley, 3800 m., 16th June, 1922, *Major E. F. Norton* 113 (Mt. Everest Expedition).

This species commemorates the name of the late Mr. George Leigh-Mallory who lost his life in an attempt to reach the summit of Mt. Everest during the expedition of 1924. His photographs and notes have proved a useful adjunct to the specimens of the flora brought back by the 1922 expedition.

1168. **Tryphostemma humile** Dandy [Passifloraceae]; affine *T. Sandersonii* Harv., sed habitu plerumque humiliore, foliis margine integris, pedunculis brevioribus 2-floris, satis distinctum.

Herba; caules subsimplices, graciles, glabri, sulcati, e rhizomate lignoso ramoso usque ad 15 cm. alti. *Folia* subsessilia, ovata vel oblongo-ovata, basi rotundata vel subrotundata, apice acuta mucronata, margine integra leviter revoluta, usque ad 2 cm. longa et 1 cm. lata, membranacea, utrinque glabra levia, nervis lateralibus inconspicuis; stipulae minutae, filiformes. *Inflorescentiae* 2-florae; pedunculus brevis; pedicelli graciles, circiter 0.7-0.8 cm. longi; bractae minutae, filiformes. *Flores* circiter 0.4-0.5 cm. longi. *Sepala* elliptica, apice obtusa, hyalina, brunneo-maculata, longitudinaliter 5-nervia. *Petala* sepalis similia angustioraque vel nulla. *Corona* duplex, exterior membranacea fimbriata, interior annularis brevis crassa. *Staminum* filamenta lata, membranacea. *Ovarium* ovoideum, minute puberulum; ovulum solitarium; styli 3-4, filiformes, ovario multo longiores, stigmatibus capitatis.

TROPICAL AFRICA. Southern Rhodesia: Melssetter distr., fl. Oct., *Walters* 2727.

1169. **Tryphostemma phaulanthum** Dandy [Passifloraceae]; ab affini *T. Hanningtoniano* Mast. habitu erecto, foliis crassioribus margine plus minusve serratis, pedunculis brevioribus, floribus capsulaque minoribus, differt.

Herba annua, ad 40 cm. alta, glaberrima, prope basim ramosa; caulis ramique adscendentes, subteretes sed inferne leviter costati. *Folia* chartacea, subtus pallidiora, fere ad basim 3-loba, lobis ellipticis sed 2 lateralibus basi inaequalibus, apice obtusis breviter mucronatis, margine irregulariter plus minusve serratis, ad 4.5 cm.

longis et 1·7 cm. latis; petioli graciles, 2·5 cm. attingentes; stipulae filiformes, parvae. *Inflorescentiae* axillares, 2-florae; pedunculi ad 7 mm. longi, in cirrhum gracillimum convolutum exeuntes; pedicelli brevissimi, circiter 1 mm. longi; bractee filiformes, minutae; alabastra oblongo-ovoidea. *Flores* minuti, vix 2 mm. longi. *Sepala* viridia, oblonga, apice rotundata, fructus basi persistentia. *Petala* nulla. *Corona* sepalis subaequalis, duplex, exterior alba breviter tubulosa laciniata laciniis filiformibus tubum aequantibus, interior brevissime cupuliformis dentata staminifera. *Antherae* vix 0·5 mm. longae. *Ovarium* breviter stipitatum; ovulum 1; styli 3 brevissimi, stigmatibus capitatis. *Capsula* ovoidea, stipitata, circiter 8 mm. longa et 4·5 mm. lata. *Semen* 1, leviter compressum, ambitu fere orbiculare, circiter 4 mm. longum et 3·5 mm. latum, distincte areolatum.

TROPICAL AFRICA. Tanganyika: Mwanza, *Davis* 208.

1170. **Tryphostemma scabrifolium** *Dandy* [Passifloraceae]; inter species foliis non lobatis ob folia subsessilia parva scabra manifeste distinctum.

Herba; rami glabri, leves, costati. *Folia* oblongo-lanceolata, basi cuneata, apice obtusa primo manifeste mucronata, margine leviter revoluta plerumque denticulis paucis callosis munita, usque ad 2 cm. longa et 0·7 cm. lata, rigida, supra scabra, subtus praesertim ad costum crassum nervosque prominentes reticulatos pilis brevibus rigidis primo albidis dense vestita; petioli brevissimi, crassi; stipulae subulatae, demum spinescentes, ad 2·5 mm. longae. *Inflorescentiae* axillares, 2-florae; pedunculi brevissimi; pedicelli graciles, ad 10 mm. longi, in fructu longiores incrassatique; bractee subulatae, parvae; alabastra oblonga, 3·5 mm. longa, albido-pilosa. *Sepala* oblonga, apice rotundata, 6·8 mm. longa et 2·2·5 mm. lata, extus rigide pilosa. *Petala* anguste oblonga, apice rotundata vel parum lobata, 4·5 mm. longa. *Corona* triplex, exterior cupuliformis margine fimbriata, intermedia crassa disciformis, interior breviter cupuliformis intus staminifera. *Filamenta* circiter 4 mm. longa; antherae circiter 2 mm. longae. *Ovarium* breviter stipitatum, ovoideum, glabrum; ovula pauca; styli 3 fere 4 mm. longi, stigmatibus capitatis. *Capsula* stipitata, ellipsoidea, circiter 1·8 cm. longa, glabra, levis. *Semina* pauca, compressa, circiter 7·5 mm. longa et 5·5 mm. lata.

TROPICAL AFRICA. Uganda: fl. and fr. April, 1926, *van Someren* (type). Kenya: Kisumu, fl. Mar., *Butler* 39.

XXXII.—MISCELLANEOUS NOTES.

It is with great pleasure we learn that Dr. O. STAPP, F.R.S., has been awarded the Gold Medal of the Linnean Society for 1927.

We note with pleasure, in the recent Birthday Honours List the following appointment to Membership of the Most Excellent Order of the British Empire, Mr. F. S. SILLITOE, Superintendent of Government Gardens, Khartoum.

Mr. W. E. BASSETT, Student Gardener, Royal Botanic Gardens, Kew, has been appointed by the Secretary of State for the Colonies, Assistant Superintendent, Victoria Botanic Gardens, Cameroons.

Mr. J. S. DASH, Professor of Agriculture, Imperial College of Tropical Agriculture, Trinidad, has been appointed by the Secretary of State for the Colonies, Director of Science and Agriculture, British Guiana.

Portrait of Mr. W. J. Bean.—Mr. Ernest Moore held an exhibition in London last year of his portraits of famous Yorkshiremen, and among them was a portrait of Mr. W. J. Bean, the Curator. This portrait has been most generously presented to the Royal Botanic Gardens by Major Reginald Loder and accepted by the Minister of Agriculture and Fisheries. The presentation of the portrait was made, in the Gardens Library, on Tuesday, 21st June, by Lord Lambourne and Major Loder in the presence of a large number of members of the staff and several prominent amateur horticulturists. After a few introductory remarks by the Director and Major Loder, Lord Lambourne, President of the Royal Horticultural Society, unveiled the portrait and the Director accepted it on behalf of the Royal Botanic Gardens. A vote of thanks to Lord Lambourne and to the artist, for the excellent portrait, was proposed by Sir David Prain. The portrait has been hung in the Gardens Library.

Arnold Arboretum.—We are informed by the President of Harvard University that Mr. E. H. Wilson, the Assistant Director, has been appointed Keeper of the Arnold Arboretum, and Mr. Oakes Ames, Professor of Botany, has been appointed Supervisor of the Arboretum, as well as of the Botanical Museum, the Cryptogamic Herbarium and the Garden at Soledad in Cuba.

These changes in the staff of the Arnold Arboretum consequent on the death of Prof. Sargent (*K.B.*, 1927, p. 221) have been made with the object of bringing the Arboretum into closer co-operation with all the other botanical departments of the University and thereby reinforcing the scientific work of the Arboretum.

A New Economic Use for *Ceanothus americanus*.—With reference to the note on this subject which appeared in *K.B.*, 1927, p. 189, paragraph three, sentence four, should have read, "The active principle is an alkaloid, but in an analysis of the drug, starch and calcium oxalate are found in varying quantities, &c." An article entitled "*Ceanothus americanus* L. as a Hemostatic, a Résumé of recent Investigations into the Chemistry, Pharmacology and Clinical Use of the Drug," by Guy C. Taylor, Ph.G., Research Laboratory of Flint, Eaton & Co., Decatur, Illinois, appeared in Vol. 99, No. 4, April, 1927, pp. 214-232, of the *American Journal of Pharmacy*. This article includes all the salient facts regarding the drug and its uses known to the present time, and it concludes with a bibliography of the subject.

W. D.

Male Irish Yew.—It is a matter of common knowledge that the first Irish Yews were two plants discovered by a Mr. Willis in the mountains of Fermanagh about 1780. One of these was planted at Florence Court, the seat of the Earl of Enniskillen, the other Willis planted in his own garden. The latter has disappeared, but the former, I believe, still exists at Florence Court, and from it probably most, or all the plants in cultivation are descendants. It is a female tree, and as its progeny, having been raised from cuttings, are naturally of the same sex, it has generally been assumed that no male plants exist. Elwes and Henry in the *Trees of Great Britain and Ireland*, p. 110, observe that "no true male Irish yew has ever been met with." Last March, however, some shoots of yew, undoubtedly male and undoubtedly Irish, were received from Mr. W. H. B. Fletcher, of Aldwick Manor, Bognor, Sussex. They were accompanied by an interesting letter, from which the following extracts are taken:—

"Having regard to the history of the Irish yew I thought that you might perhaps like to see specimens of plants which I take to be the male form of the green type and of one of its variegated forms which I have come across during the last few days under the following circumstances. I was going along a footpath leading to the graveyard at North Mundham, a parish between Bognor and Chichester, which is bounded by high hedges, perhaps some 10 ft. high, in which are some variegated Irish yews. I gave two of these a tap with my walking stick, and was surprised to see a cloud of pollen drift off. These hedges were planted for my late brother, who was Vicar of the parish from 1882-1926, so I suspected whence he got the yews.

"In the course of a day or two it occurred to me to have a look round the Irish yews in my own shrubbery, and there I found three male bushes of the green form and one of the variegated, all about 10 ft. in height, as well as smaller bushes of the variegated form.

"A few days later I examined the variegated Irish yews at our County Mental Hospital at Chichester, and there found three good bushes of the variegated Irish (male).

"My own bushes came from The Barnham Nurseries, Ltd., Barnham, near Bognor, in the planting season 1900-01. No doubt the others came from the same place.

"A day or two ago I went to the Nursery, which has been going about 50 years, and saw the foreman, who has been there 40 years. He told me they had continuously propagated the Irish yews by cuttings from the stock on the premises and did not grow them from seed.

"He did not know where their stock originally came from. They have in the nursery a good many bushes of the male variegated Irish Yew, 6-8 ft. high, in two forms, one brighter than the other.

"They seem to have none of the green form of the male now, as their stock of Irish yews became very low during the war and they had to buy in a fresh stock. I examined the new stuff, but could find no males among it.

"It is unfortunate that so far one has been unable to find out the earlier history of these forms."

From what Mr. Fletcher states there does not now appear to be any chance of ascertaining the origin of male Irish yews about which he writes. In the *Gardeners' Chronicle*, July 18, 1891, p. 68, Dr. Masters had a note about the Irish yew in which he states that he had lately received from Mr. Tillett, of Sprowston, near Norwich, sprays bearing "unequivocal male flowers." Whether these were gathered from an entirely male tree or from "sporting" branches on a female one is not stated.

The chief distinction of the Irish yew from the common one, besides that of its erect habit, is the radial arrangement of its leaves, an arrangement which, in the common yew, occurs only on the leading shoots. The ordinary pectinate arrangement is never seen. An Irish yew, therefore, may be regarded as an assemblage of leading shoots.

The flowers of the ordinary Irish yew occasionally develop fertile seeds, having been fertilised by common yew. Such seeds have been sown at different times at Kew, but no true Irish yew has been raised from them. They usually revert to common yew, but a few of them have shown a tendency towards a fastigate habit. Possibly the varieties *erecta* and *nidpathensis* have originated in this way, both being characterised by a partial or wholly radial arrangement of the leaves.

W. J. B.

A Treatise on Viticulture.*—This work is intended to serve both the student and practical grape-grower, particularly readers in

* By A. I. Perold. Macmillan & Co., Ltd., St. Martin's Street, London, 1927. Pp. 696, ill. 108. Price 25s.

South Africa, Australia and California. The first few chapters are devoted to the biology of the vine, internal and external morphology and ampelography. These are followed by chapters on propagation, grafting, diseases and cultivation in general. The production and sale of table grapes for export is dealt with in great detail and will be of special interest, particularly to South African readers in view of the development of the grape export industry from the Cape in recent years. An exhaustive bibliography, accompanied by an alphabetical list of grape species and varieties is a useful feature of a book that should make a strong appeal to all interested or engaged in viticulture.

F. N. H.

Flora of the Maltese Islands.*—This most interesting and, for the price, well published book should prove of great use not merely to students of botany in the Valetta University, but also to visitors to the islands and to all who work on the flora of the Mediterranean Basin. The bulk of the book is occupied with full descriptions, in English, of the genera and species of Maltese plants, accompanied by details of their general and Maltese distribution, flowering periods, habitats, vernacular names, and uses. An introduction of 68 pages contains an account of the history of botanical exploration, of the geology, water supply, climate, and vegetation. Full acknowledgment is given of the researches of the late Mr. J. F. Duthie, who collected in the islands in 1871-72 and 1874, and it may be useful to call attention to the excellent sets of specimens collected by him during these visits and now in the Kew Herbarium. In spite of the small size of these islands, their dense population, and high cultivation, and of the absence of mountains and forests the wild flora is still rich and interesting. The rocks and soils are predominantly calcareous and calcifuge plants are therefore rare. The flora is definitely Italian in its character and there are at most only two or three species which are endemic.

W. B. T.

Eradication of *Lantana* in Bombay.—According to the "Review of Agricultural Operations in India, 1925-26" it is stated that "After a considerable number of trials in Bombay with different agents and methods, it appears that a large measure of success in eradicating *Lantana* can be obtained by the following method. The *Lantana* bush is cut down and the stump painted with Sodium Arsenate. This method is reported to have given 94% of success when tried on a large scale in jungle conditions; recutting and repainting of sprouted surviving plants with Sodium Arsenate completely wiped them out. Chemical analysis shows that the Arsenic penetrates the plant and reaches the smaller root branches."

* Descriptive flora of the Maltese Islands, including the ferns and flowering plants, by John Borg, M.A., M.D., Malta. Government Printing Office, 1927. 5s. pp. 846.

Printed under the authority of HIS MAJESTY'S STATIONERY OFFICE
By Wyman & Sons, Limited, Fetter Lane, London, E.C. 4.